

Application Number 10/823,483  
Amendment dated January 22, 2008  
Response to Office Action mailed November 26, 2007

### Remarks/Arguments

Does Huffman teach the "closing spaced electrodes cause a qualitative increases in the operation of thermionic devices, such as 10 Angstroms"?

Does Huffman "provide motivation for utilizing the lower end of the disclosed ranges, that being that the having the smaller electrode spacing provides a qualitative performance due to the tunneling effect"?

These are the points Examiner uses, first in section 3 in arguing that Shakouri and Fitzpatrick, in further view of Huffman, render claims 1-7 and 10-14 as being unpatentable, and secondly in the section entitled "Response to Arguments" wherein Applicant's argument regarding performance is considered to be not persuasive.

Factual findings made by Office personnel are the necessary underpinnings to establish obviousness, and Applicant traverses the rejection and presents below a reasoned statement explaining why the applicant believes the Office has erred substantively as to the factual findings. Applicant presents what is factual, rather than suppositional or convenient, concerning the disclosure of Huffman.

Examiner's rejections of the claims in view of Huffman appear to be somewhat conclusory, lacking in articulated reasoning or underpinning rational supporting the legal conclusion of obviousness. This is especially true of Examiner's adherence to the notion that Huffman teaches a qualitative improvement in performance absent any reasoned explanation as to why these so-called qualitative aspects should over-ride the clear and quantitative findings of the report.

In essence, Huffman hypothesizes that close-spaced electrodes should lead to an increase in performance, and then experimentally demonstrates the hypothesis to be false. What is factual, then, is that Huffman does not teach: "closing spaced electrodes cause a qualitative increases in the operation of thermionic devices, such as 10 Angstroms". As a point of fact, Huffman teaches that providing close-spaced electrodes leads to a reduction in the performance of a device.

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In detail, the findings of the Huffman paper may be considered to be as follows: referring to Figure 8, Examiner should note that here Huffman has shown a Figure of Merit performance curve based on extrapolations, which show that at 900K (the operating temperature of his experimental device), the Figure of Merit is about  $10^{-2}$ . This is about an order of magnitude better than conventional thermoelectric devices, and Applicant agrees that this would of course constitute an improvement in performance if it were to be realized experimentally.

However, the experimental data were some 200-fold lower than expected (see the DISCUSSION section); in other words the Figure of Merit was more like  $5 \times 10^{-5}$ , which is more than an order of magnitude lower than conventional thermoelectric devices.

Thus the teaching of Huffman's experimental investigation is solid, tangible, measurable, quantitative evidence that there is neither a qualitative nor quantitative increase, but instead a decrease, in the performance of the device having electrodes separated by 10 angstroms. The decrease in performance observed is not trivial, and is more than order of magnitude.

Applicant fails to see how, in the face of solid, quantitative experimental results, which incontrovertibly show that the TTC of Huffman performs less well than a conventional TEC, that Examiner can say that Huffman is teaching that there is a qualitative increase in performance.

Furthermore, in scientific endeavor, once a hypothesis is shown to be false, then it ceases to have motivational momentum. Once an idea is discredited, then it can no longer be considered to be something that would make a course of action obvious to follow – why would a person of ordinary skill in the art, who is considered to know of all the relevant art, embark on a course of action that is known to not yield a desired result?

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Applicant therefore believes that Huffman discredits his own teaching, and therefore Examiner has not made a *prima facie* case for the combination of the prior art of Shakouri and Fitzpatrick with Huffman.

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Applicant respectfully submits that this application is in condition for allowance, and such disposition is earnestly solicited. If the Examiner believes that discussing the application with the Applicant over the telephone might advance prosecution, Applicant would welcome the opportunity to do so.

Respectfully submitted,

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